

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
8 September 2000 (08.09.2000)

PCT

(10) International Publication Number
WO 00/52789 A3

(51) International Patent Classification⁷: H01S 3/10, 5/026

Court, Middletown, NJ 07748 (US). FISH, Gregory
[US/US]; 4716 Frazier Lane, Santa Barbara, CA 93110
(US).

(21) International Application Number: PCT/US00/05235

(22) International Filing Date: 29 February 2000 (29.02.2000)

(74) Agent: DAWES, Daniel, L.; Myers, Dawes & Andras
LLP, 5252 Kenilworth Drive, Huntington Beach, CA 92649
(US).

(25) Filing Language: English

(26) Publication Language: English

(81) Designated States (*national*): CA, US.

(30) Priority Data:
60/122,194 1 March 1999 (01.03.1999) US

(84) Designated States (*regional*): European patent (AT, BE,
CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC,
NL, PT, SE).

(71) Applicant (*for all designated States except US*): THE
REGENTS OF THE UNIVERSITY OF CALIFORNIA
[US/US]; 1111 Franklin Street, 5th floor, Oakland, CA
94607 (US).

Published:
— With international search report.

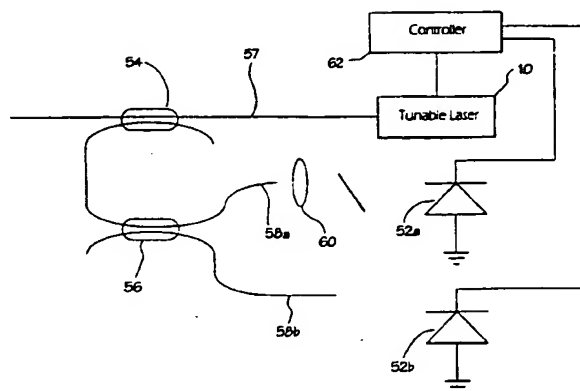
(88) Date of publication of the international search report:
11 January 2001

(72) Inventors; and

(75) Inventors/Applicants (*for US only*): COLDREN, Larry
[US/US]; 4665 Via Vistosa, Santa Barbara, CA 93110
(US). MASON, Thomas, Gordon, B. [US/US]; 3 Lefferts

*For two-letter codes and other abbreviations, refer to the "Guid-
ance Notes on Codes and Abbreviations" appearing at the begin-
ning of each regular issue of the PCT Gazette.*

(54) Title: A TUNABLE LASER SOURCE WITH AN INTEGRATED WAVELENGTH MONITOR AND METHOD OF OPER-
ATING SAME



WO 00/52789 A3

(57) Abstract: IPCavelength monitor is provided based on the transmission response of an optical filter (50). The monitor (52a, 52b) provides feedback to the laser (10) enabling it to lock to any given wavelength within its tuning range. The invention is also a process for integrating the wavelength monitor directly on chip with a variety of tunable semiconductor lasers. The invention also comprises a method for controlling the wavelength of a tunable laser by using a wavelength monitor to measure the output light and provide feedback to a control system (62). The laser and wavelength monitors are integrated together on a single indium phosphide chip. The wavelength monitor comprises a filter (50) with a wavelength dependent transmission function and a pair of detectors (52a, 52b). One detector (52a) is illuminated with light that has passed through the filter and the other provides a reference to measure the input intensity. Taking the ratio of the filtered light level to the unfiltered light provides a wavelength dependent signal. The filter (50) is designed such that the transmission function is monotonic and varies from a minimum at one extent of the laser's tuning range to a maximum at the other extent.

INTERNATIONAL SEARCH REPORT

International Application No

PCT/US 00/05235

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 H01S3/10 H01S5/026

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 H01S

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, PAJ, IBM-TDB, INSPEC, COMPENDEX

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 97 05679 A (IP JOSEPH ;JDS FITEL INC (CA); COLBOURNE PAUL (CA); TEITELBAUM NEI) 13 February 1997 (1997-02-13) page 1, line 1 -page 1, line 13 page 2, line 28 -page 4, line 20 page 6, line 24 -page 7, line 21; figures 1A-2	1, 14
X	MASON B ET AL: "TUNABLE SAMPLED-GRATING DBR LASERS WITH INTEGRATED WAVELENGTH MONITORS" IEEE PHOTONICS TECHNOLOGY LETTERS,US,IEEE INC. NEW YORK, vol. 10, no. 8, 1 August 1998 (1998-08-01), pages 1085-1087, XP000769864 ISSN: 1041-1135 the whole document	1, 13, 14, 22

-/-



Further documents are listed in the continuation of box C.



Patent family members are listed in annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"A" document member of the same patent family

Date of the actual completion of the international search

7 September 2000

Date of mailing of the international search report

18/09/2000

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
Fax: (+31-70) 340-3018

Authorized officer

Gnugesser, H

INTERNATIONAL SEARCH REPORT

International Application No

PCT/US 00/05235

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 4 309 671 A (MALYON DEREK J) 5 January 1982 (1982-01-05) column 1, line 1 -column 2, line 59; figure 1	1
X	EP 0 615 321 A (AT & T CORP) 14 September 1994 (1994-09-14) column 2, line 1 -column 2, line 14 column 2, line 33 -column 2, line 38 column 3, line 6 -column 3, line 11 column 4, line 16 -column 5, line 57; claim 2	1
X	EP 0 867 989 A (ANDO ELECTRIC) 30 September 1998 (1998-09-30) column 7, line 16 -column 8, line 26; figure 1	1,13,14
X	PATENT ABSTRACTS OF JAPAN vol. 1996, no. 03, 29 March 1996 (1996-03-29) -A JP 07 307516 A (KOKUSAI DENSHIN DENWA CO LTD), 21 November 1995 (1995-11-21) abstract	1,13
X	EP 0 818 859 A (NORTHERN TELECOM LTD) 14 January 1998 (1998-01-14) column 4, line 37 -column 4, line 43 column 5, line 12 -column 5, line 46 column 6, line 20 -column 7, line 11; figures 1,4,5	13
A	US 5 323 409 A (LASKOSKIE CLARENCE E ET AL) 21 June 1994 (1994-06-21) column 2, line 56 -column 5, line 55; figures 1,2,4	1,14
E	EP 0 939 470 A (NIPPON ELECTRIC CO) 1 September 1999 (1999-09-01) column 4, line 35 -column 5, line 41; figures 1-3	1,13,14
E	WO 99 43060 A (UNIPHASE TELECOMMUNICATIONS PR) 26 August 1999 (1999-08-26) page 11, line 1 -page 13, line 17; figure 1	1,13,14

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/US 00/05235

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 9705679 A	13-02-1997	AU 6119396 A US 5798859 A	26-02-1997 25-08-1998
US 4309671 A	05-01-1982	DE 2862391 D EP 0001714 A GB 2007015 A, B JP 1012113 B JP 1554568 C JP 54074386 A	26-04-1984 02-05-1979 10-05-1979 28-02-1989 23-04-1990 14-06-1979
EP 0615321 A	14-09-1994	US 5299212 A DE 69403978 D DE 69403978 T JP 6350565 A	29-03-1994 07-08-1997 16-10-1997 22-12-1994
EP 0867989 A	30-09-1998	JP 10270800 A DE 69800018 D DE 69800018 T US 5970076 A	09-10-1998 07-10-1999 04-05-2000 19-10-1999
JP 07307516 A	21-11-1995	NONE	
EP 0818859 A	14-01-1998	US 5825792 A CA 2209558 A JP 10079723 A	20-10-1998 11-01-1998 24-03-1998
US 5323409 A	21-06-1994	AU 660069 B AU 3413993 A BR 9206826 A CA 2119143 A DE 69211013 D DE 69211013 T EP 0615665 A FI 942613 A JP 7501659 T NO 941626 A WO 9311589 A	08-06-1995 28-06-1993 01-03-1995 10-06-1993 27-06-1996 28-11-1996 21-09-1994 03-06-1994 16-02-1995 03-05-1994 10-06-1993
EP 0939470 A	01-09-1999	JP 11251673 A	17-09-1999
WO 9943060 A	26-08-1999	AU 2971999 A	06-09-1999